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Forest Health Protection
Pacific Southwest Region

USDA

Date: August 17, 2005
File Code: 3420

To: Forest Supervisors, Modoc, Plumas, Sequoia, Sierra, Stanislaus and Tahoe National Forests

To: Park Superintendents, Sequoia, Kings Canyon and Yosemite National Parks

Subject: Results of 2005 larval surveys for Douglas-fir tussock moth (FHP Report # NE05-07).

Summary

The results of egg mass, larval and adult Douglas-fir tussock moth surveys last year prompted additional larval surveys in July of 2005 in many areas from the southern Cascades to the southern end of the Sierra Nevada. Areas of concern for either defoliation or the likelihood of adverse human health effects due to the hairs from the larvae were identified in May 2005 by National Forest and National Park personnel. These areas were subsequently sampled by Forest Health Protection staff. The results of the sampling are included and discussed in this report.

In general, midcrown densities that are < 1, are two or more years away from a potential outbreak. Midcrown densities that are between 2 and 20 are typically one year away from a potential outbreak. Due to the variability associated with sampling and population levels, some defoliation may be observed in areas where the midcrown estimates of larval densities approach 20. Visible defoliation should be anticipated when the midcrown larval densities exceed 20. Some tree mortality may also be observed as the midcrown estimates of larval densities increase above 20.

There are two areas that were sampled in 2005 that exceeded estimated midcrown larval densities of 20. One is located in the same area as Trap Plot (#613) on the Bass Lake Ranger District, Sierra National Forest and the other is located in Yosemite National Park at Chinquapin. These areas are already in outbreak and may reach peak populations levels in 2006 resulting in severe defoliation of host trees. Some complete defoliation and mortality should be anticipated. There were several plots with estimated midcrown larval densities between 2 and 20. These occurred on the Big Valley RD, Modoc National Forest, Mt. Hough RD, Plumas NF, Greenhorn, Hot Springs, Hume Lake and Tule River RD's, Sequoia National Forest, Bass Lake RD, Sierra National Forest, Mi-Wuk RD, Stanislaus National Forest, Downieville, Nevada City and Foresthill RD, Tahoe National Forest, and in Yosemite National Park. If larval survival this summer is high and egg mass densities are high this fall, heavy defoliation, tree mortality and

top-kill, characteristic of the peak stage of an outbreak, will probably occur in some areas in 2006.

A letter sent to the Forest Supervisors of the Stanislaus, Sierra, and Sequoia National Forests (dated May 9, 2005) outlined the additional steps required to initiate the NEPA process if Forests/Parks intend to implement a DFTM control project in 2006 (attached). Feasible treatment options would involve the aerial application of biopesticides. The NEPA analysis to implement a DFTM control project will require an Environmental Impact Statement (EIS). While additional life stage (cocoons and egg masses) sampling later this year (October) and the extent and degree of defoliation that occurs this summer will provide supplementary information that will assist in determining the phase of the outbreak cycle, the timeline to complete an EIS necessitates that the NEPA process must be initiated soon. Please contact the Forest Health Protection staff for your area in you are interested in pursuing a treatment project.

Background

The Douglas-fir tussock moth (DFTM), *Orgyia pseudotsugata* (Lepidoptera: Lymantriidae), is native defoliator of true firs and Douglas-fir in western North America. The primary host for DFTM in California is white fir although other conifer species may be fed upon when larval densities are high. Defoliation can result in tree mortality, top-kill and growth loss, with consequent diverse effects on forest ecosystems and resource management objectives. There have been 6 major outbreaks of DFTM in California since 1935, the most recent occurring in the southern Sierra Nevada from 1997-1999 in the Sequoia and Kings Canyon National Parks and the Sequoia National Forest. Outbreaks tend to occur with little warning, last for three to four years and are characterized by having four phases: pre-outbreak, release, peak and decline. The highest population densities and most of the tree injury usually occur during the peak and early decline phases.

Historically, DFTM outbreaks have been detected after some injury has already occurred, limiting timely decision-making. In an effort to identify areas where DFTM populations are starting to increase towards outbreak levels, an "early warning" system was implemented throughout the west, including northern California throughout the Sierra Nevada. This system uses traps baited with a synthetic DFTM female pheromone to catch male moths (Daterman et. al. 1976, 1979). The number of male moths captured can be an indication of the number of larvae that will be present the following spring and moth trap catches can also help identify areas where populations are increasing toward outbreak levels. The intent of providing an "early warning" of an outbreak is to give resource managers time to conduct decision support activities and allow for more timely decision-making.

2003

Average DFTM male moth trap catches from 2003 showed increases in many plots in California compared to 2002 catches. Data were collected for 163 plots during 2003 with over 35% (57 plots) averaging more than 25 males moths per trap. In 2002, only 4% of the plots exceeded an average of 25 moths per trap. High trap counts during 2003 were found on many National

Forests including the Eldorado, Lassen, Plumas, Sequoia, Sierra, Stanislaus and Tahoe. There were also three trap plots on lands of other ownership that exceeded 25 moths per trap. One plot was located in Yosemite National Park, one on Bureau of Land Management (BLM) land in Lassen County and one plot monitored by the California Department of Forestry (CDF) in Modoc County. The increases in trap catches during 2003 indicated a potential increase in activity by DFTM in 2004. An increase in trap catches was also observed in southern Oregon during 2003.

2004

During 2004 increasing DFTM populations were detected over a broad area from northern California to the southern Sierra Nevada. A low level of larval activity and very light feeding injury, restricted to the current year foliage was observed on the Eldorado, Sequoia, Sierra, and Stanislaus National Forests and in Sequoia and Kings Canyon National Parks and Yosemite National Park. Limited egg mass sampling on the Stanislaus and Sierra National Forests and in Yosemite National Park indicated that if egg and larval survival were good, increased defoliation could be expected in 2005-2006.

During 2004 traps were installed in 174 plots (5 traps/plot) with data collected for 162 plots (12 plots were snowed out prior to data collection). Forty-five plots (26%) averaged 25 or more male moths per trap. In comparison, 35 % of the plots averaged >25 males moths per trap in 2003. Plots that averaged >25 moths per trap for 2004 were located on the following National Forests: Eldorado, Lassen, Modoc, Plumas, Sequoia, Sierra, Stanislaus and the Tahoe. In addition to these plots monitored on National Forest lands there were seven plots that exceeded an average of 25 moths/trap on lands of other ownership. Four of these plots were located in Yosemite National Park, 1 on BLM land near Widow Peak, west of the town of Bieber in Lassen county, and 2 plots, 1 each in Calaveras and Shasta counties, monitored by CDF. Over the range of DFTM in California, the general trend of moth catches was down for 2004 compared to 2003; however, several plots remained high over the 2 years (Table 1).

2005

The results of the 2004 egg mass, larval and adult surveys prompted additional larval surveys in July of this year in many areas from the southern Cascades to the southern end of the Sierra Nevada. Areas of concern for either defoliation or the likelihood of adverse human health effects due to the hairs from the larvae were identified by National Forest and National Park personnel. These areas were subsequently sampled by Forest Health Protection staff. Brian Mattos, Park Forester, also assisted with the surveys in Yosemite National Park The results of lower crown larval sampling are converted to midcrown densities per 1000^2 inches of foliage to provide estimates of the phases DFTM populations are in and to provide some information about the likelihood of defoliation occurring (Table 2). The results of larval sampling can vary greatly within an area and between individual trees in a stand. In general, midcrown densities that are < 1, are two or more years away from a potential outbreak. Estimates of midcrown densities that are between 2 and 20 are typically one year away from a potential outbreak. Due to the variability associated with sampling and population levels, some defoliation may be observed in areas where the midcrown estimates of larval densities approach 20. Visible defoliation should

be anticipated when the midcrown larval densities exceed 20. Some tree mortality may also be observed as the midcrown estimates of larval densities increase above 20. At outbreak levels there is a reasonably high probability that there will be significant defoliation of true fir (primarily white fir) that could result in moderate to high levels of top-kill and mortality. In addition, DFTM larvae have urticating hairs that can cause an allergic reaction in some people and thus they can be a potential public health problem in developed recreation and other high-use areas.

Results

Areas > 20 larvae per 1000^2 inches of foliage

There are two areas that were sampled in 2005 that exceeded estimated midcrown larval densities of 20. One is located in the same area as Trap Plot (#613) on the Bass Lake Ranger District, Sierra National Forest and the other is located in Yosemite National Park at Chinquapin. These areas are already in outbreak and may reach peak populations levels in 2006 resulting in severe defoliation of host trees. Some complete defoliation and mortality should be anticipated.

Areas >2 <20 larvae per 1000^2 inches of foliage

There were several plots with estimated midcrown larval densities between 2 and 20. These occurred on the Big Valley RD, Modoc National Forest, Mt. Hough RD, Plumas NF, Greenhorn, Hot Springs, Hume Lake and Tule River RD's, Sequoia National Forest, Bass Lake RD, Sierra National Forest, Mi-Wuk RD, Stanislaus National Forest, Downieville, Nevada City and Foresthill RD, Tahoe National Forest, and in Yosemite National Park. See Table 2 for specific areas that were sampled. As mentioned above, some defoliation may be observed in these areas this year and in other areas that were not identified by your resource personnel to be sampled during July, 2005.

Douglas-fir tussock moth populations have several natural enemies and well as a nuclear polyhedrosis virus that kills insects in the larval stage. It is possible that the populations will peak this year and decline due to natural factors without causing extensive tree mortality. It is also possible that populations will continue to increase and the outbreak will continue to develop. Outbreaks of DFTM are commonly preceded by a generation in which a relatively high proportion of larvae has survived (Mason and Torgersen 1983). Larval populations next year (2006) could be even higher and feeding injury very evident. If larval survival this summer is high and egg mass densities are high this fall, heavy defoliation, tree mortality and top-kill, characteristic of the peak stage of an outbreak, will probably occur in some areas in 2006.

Management

A letter sent to the Forest Supervisors of the Stanislaus, Sierra, and Sequoia National Forests (dated May 9, 2005) outlined the additional steps required to initiate the NEPA process if Forests/Parks intend to implement a DFTM control project in 2006 (attached). Feasible treatment options would involve the aerial application of biopesticides. The NEPA analysis to implement a DFTM control project will require an Environmental Impact Statement (EIS).

While additional life stage (cocoons and egg masses) sampling later this fall, and the extent and degree of defoliation that occurs this summer, will provide supplementary information that will assist in determining the phase of the outbreak cycle, the timeline to complete an EIS necessitates that the NEPA process must be initiated soon.

Field going personnel are urged to continue to check for evidence of feeding and defoliation on true fir (primarily white fir) throughout the susceptible host type this coming summer and fall and report any findings to their Forest Health Protection Shared Services Area Entomologist.

/s/ *Sheri Smith*

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Table 1. Number of Douglas-fir tussock moth pheromone detection survey plots by trap catch for 1995-2004.

Year	Total # of Plots	NUMBER OF PLOTS WITH AN AVERAGE MOTH CATCH PER TRAP OF:													
		0<10	10<20	20<25	25<30	30<35	35<40	40<45	45<50	50<55	55<60	60<65	65<70	70<75	75+
1995	158	77	35	13	16	7	7	3	0	0	0	0	0	0	0
	100%	49%	22%	8%	10%	4.5%	4.5%	2%							
1996	149	33	26	16	8	7	12	9	5	8	6	8	5	1	5
	100%	22%	17%	11%	6%	4%	8%	6%	3%	6%	4%	6%	3%	1%	3%
1997	142	88	27	10	9	4	3	0	0	1	0	0	0	0	0
	100%	62%	19%	7%	6%	3%	2%			<1%					
1998	159	81	22	11	9	6	3	10	7	5	2	1	1	1	0
	100%	51%	14%	7%	6%	3%	2%	6%	4%	3%	<1%	<1%	<1%	<1%	
1999	159	126	20	5	3	2	2	0	0	0	1	0	0	0	0
	100%	79%	13%	3%	2%	1%	1%				1%				
2000	185	154	15	4	4	0	1	2	2	2	0	0	1	0	0
	100%	83%	8%	2%	2%		<1%	1%	1%	1%			<1%		
2001	183	95	57	13	10	6	0	1	1	0	0	0	0	0	0
	100%	52%	31%	7%	5%	3%		<1%	<1%						
2002	168	126	31	5	3	3	0	0	0	0	0	0	0	0	0
	100%	75%	18%	3%	2%	2%									
2003	163	53	42	11	11	10	14	13	3	1	4	0	1	0	0
	100%	32%	26%	7%	7%	6%	8%	8%	2%	1%	2%		1%		
2004	174	68	43	6	16	11	6	5	3	0	2	1	1	0	0
	* 93%	39%	25%	3%	9%	6%	3%	3%	2%		1%	<1%	<1%		

* 12 plots were not collected due to snow, table will be updated to reflect additional data in 2005.

Table 2. Douglas-fir tussock moth early stage larval densities for 2005.

Forest	Ranger District	Plot Name	* M <2 larval density	* M = 2-19 larval density	*M >20 larval density
BLM	Modoc Co.	Widow Peak 1	0.96		
Lassen	Almanor	Morgan Summit	0.8		
Modoc NF	Big Valley	Deer Springs	0.8		
Modoc NF	Big Valley	Horsehead 2	1.2		
Modoc NF	Big Valley	Horsehead 1	1.76		
Modoc NF	Big Valley	Hunter 1		**3.2**	
Modoc NF	Big Valley	Niles		**3.68**	
Modoc NF	Big Valley	Hunter 4		**6.4**	
Plumas	Mt. Hough	B4 11-20		**3.2**	
Sequoia	Hume Lake	Aspen Hollow	0.07		
Sequoia	Tule River	Coy Flat	0.08		
Sequoia	Hume Lake	Eshom CG	0.27		
Sequoia	Hot Springs	Long Meadow CG	0.75		
Sequoia	Hume Lake	Princess CG	1.14		
Sequoia	Hot Springs	Holey Meadow CG		**2**	

Forest	Ranger District	Plot Name	* M <2 larval density	* M = 2-19 larval density	*M >20 larval density
Sequoia	Tule River	Peppermint CG		**2.03**	
Sequoia	Tule River	Quaking Aspen		**6.25**	
Sequoia	Greenhorn	N. Greenhorn Summit		**8.88**	
Sequoia	Hume Lake	Hitchcock Meadow		**13.4**	
Sequoia	Greenhorn	Shirley Meadow		**16.7**	
Sequoia-Kings Canyon National Park		Cove CG	0.07		
Sequoia-Kings Canyon National Park		Bobcat Point	0.21		
Sequoia-Kings Canyon National Park		N. Bear Trap Meadow	0.23		
Sequoia-Kings Canyon National Park		KC Park Entrance	0.48		
Sequoia-Kings Canyon National Park		NE of Sunset Rock Parking	0.62		

Forest	Ranger District	Plot Name	* M <2 larval density	* M = 2-19 larval density	*M >20 larval density
Sequoia-Kings Canyon National Park		Dorst CG	1		
Sequoia-Kings Canyon National Park		General Grant Grove	1.06		
Sierra NF	Bass Lake Ranger District	DFTM trap plot # 610	0.1		
Sierra NF	Bass Lake Ranger District	Fish Creek	0.19		
Sierra NF	Bass Lake Ranger District	Soquel CG	0.36		
Sierra NF	Bass Lake Ranger District	Whiskers CG	0.56		
Sierra NF	Bass Lake Ranger District	Grey Mtn. CG	1.52		
Sierra NF	Bass Lake Ranger District	Texas Flat CG	1.53		

Forest	Ranger District	Plot Name	* M <2 larval density	* M = 2-19 larval density	*M >20 larval density
Sierra NF	Bass Lake Ranger District	Kelty Meadows		**2.03**	
Sierra NF	Bass Lake Ranger District	Whiskey Falls		**6.08**	
Sierra NF	Bass Lake Ranger District	DFTM trap plot # 605		**6.16**	
Sierra NF	Bass Lake Ranger District	Gaggs CG		**11.4**	
Sierra NF	Bass Lake Ranger District	Summit CG		**13.8**	
Sierra NF	Bass Lake Ranger District	DFTM trap plot # 611		**18.7**	
Sierra NF	Bass Lake Ranger District	DFTM Plot # 613			**121.6**
Stanilaus NF	Calaveras	Big Meadow CG	0		
Stanilaus NF	Mi-Wuk	Burst Rock/Crabtree Trailhead	0.08		

Forest	Ranger District	Plot Name	* M <2 larval density	* M = 2-19 larval density	*M >20 larval density
Stanilaus NF	Calaveras	Cottage Springs CG	0.16		
Stanilaus NF	Calaveras	Sand Flat CG	0.2		
Stanilaus NF	Mi-Wuk	Fraser Flat CG	0.36		
Stanilaus NF	Mi-Wuk	Dodge Ridge Ski Area	0.7		
Stanilaus NF	Mi-Wuk	Pine Crest Rec. Area (Meadowview CG)	1.6		
Stanilaus NF	Mi-Wuk	Pine Crest Rec. Area (Ranger Station)	1.88		
Stanilaus NF	Mi-Wuk	Hull Creek CG		**4.88**	
Tahoe	Downieville	Blue	0		
Tahoe	Foresthill	Secret House	0.08		
Tahoe	Foresthill	Cert Stand	0.4		
Tahoe	Nevada City	White Cloud	1.2		
Tahoe	Nevada City	Cherry Hill	1.76		
Tahoe	Downieville	Bald Top		**2.4**	
Tahoe	Downieville	Pliocene		**2.64**	

Forest	Ranger District	Plot Name	* M <2 larval density	* M = 2-19 larval density	*M >20 larval density
Tahoe	Nevada City	Chalk Bluff		**4.48**	
Tahoe	Nevada City	Snow Tent		**6.48**	
Tahoe	Foresthill	Mumford Bar		**9.28**	
Yosemite NP		Carlon Day Use Area	0		
Yosemite NP		Hodgen Meadow CG	0.76		
Yosemite NP		South Entrance		**3.04**	
Yosemite NP		Mariposa Grove		**3.08**	
Yosemite NP		Tuolumne Grove parking		**4.8**	
Yosemite NP		Crane Flat CG		**6.9**	
Yosemite NP		Yosemite West		**13.4**	
Yosemite NP		Chinquapin			**33.4**

*** M = Estimated midcrown density of larvae/per 1000^2 inches of foliage.**

File Code: 3400 **Date:** May 9, 2005
Route To:

Subject: Douglas-fir Tussock Moth Control NEPA Process

To: Forest Supervisors, Stanislaus, Sierra, and Sequoia National Forests

REPLY DUE JUNE 6, 2005

Refer to: 3400 Request for Information – Potential Treatment Areas for Douglas-fir Tussock Moth Control (September 23, 2004).

Conversations this spring with members of your Forest staff have indicated interest in pursuing a Douglas-fir Tussock Moth (DFTM) Control Project in 2006. This interest now needs to be finalized in order to allocate funding and initiate the NEPA process. You are being requested to confirm your Forest's interest in participating in a DFTM Control Project.

Background: Regional monitoring for Douglas-fir Tussock Moth (DFTM) indicates that populations are increasing in areas of the Southern Sierra Nevada from the Eldorado NF to the Sequoia NF. Egg mass surveys (Fall, 2004) were not fully completed due to snow. Where conducted, these surveys showed lower numbers, indicating the peak year may be 2006, or that if the peak year is 2005, damage may not be as heavy. Larval surveys are being planned for June where 2004 trap plots indicated a high potential for population increases and/or in areas you designate as high priority for treatment.

NEPA analysis to implement a DFTM control project will require an EIS. It is anticipated that one multi-forest EIS would be completed. The possible inclusion of Yosemite and King's Canyon/Sequoia National Parks in this EIS is being pursued at this time. Feasible treatment options would involve the aerial application of biopesticides.

While future life stage surveys will provide better information on the possible extent and severity of a DFTM outbreak, the timeline to complete an EIS necessitates that the NEPA process must be initiated soon. The first step is the publication of a Notice of Intent to prepare an EIS in the Federal Register.

State and Private Forestry requested and obtained money to fund an EIS this year in anticipation of a DFTM control program in 2006. This money needs to be used on this project or be made available for other appropriate uses. Resolution of your commitment to this project is needed by the Reply Due Date to determine whether any funding is available for allocation to other projects that can still be implemented this year.

Additional steps that need to be accomplished to begin the NEPA process

1. A lead coordinator from one of the affected Forests needs to be designated to insure the Notice of Intent is completed and submitted to the Federal Register. John Wenz provided a draft NOI which can be utilized, if you concur.

2. Specialist Availability – Please indicate what personnel you would assign to the project or whether you intend to contract the effort. Anticipated needs include a Biologist, Hydrologist, GIS specialist, Silviculturist, writer/editor, and Entomologist.

If you have any questions, please contact Bob Carroll, Acting Pesticide Use Specialist, at (707) 562-8916.

/S/ RICK ALEXANDER (FOR)
JACK A. BLACKWELL
Regional Forester

cc: John Pronos, Sheri Smith, Julie Lydick, David Bakke, Robert L Carroll